



Grower Summary

PO 019a

The Bedding and Pot Plant Centre – new product opportunities for bedding and pot plant growers

Objective 2: *To evaluate a range of products alone or in combination, to increase the success rate and reduce rooting time in unrooted cuttings.*

Annual 2018

Disclaimer

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document.

©Agriculture and Horticulture Development Board 2017. No part of this publication may be reproduced in any material form (including by photocopy or storage in any medium by electronic mean) or any copy or adaptation stored, published or distributed (by physical, electronic or other means) without prior permission in writing of the Agriculture and Horticulture Development Board, other than by reproduction in an unmodified form for the sole purpose of use as an information resource when the Agriculture and Horticulture Development Board or AHDB Horticulture is clearly acknowledged as the source, or in accordance with the provisions of the Copyright, Designs and Patents Act 1988. All rights reserved.

The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

AHDB Horticulture,
AHDB
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

Project title: The Bedding and Pot Plant Centre – new product opportunities for bedding and pot plant growers

Objective 2: *To evaluate a range of products alone or in combination, to increase the success rate and reduce rooting time in unrooted cuttings.*

Project number: PO 019a

Project leader: Dr Jill England, ADAS Boxworth

Report: Annual report, 31 March 2018

Previous report: None

Key staff: Dr Jill England (ADAS), Senior Horticulture Consultant

Chloe Whiteside (ADAS), Horticulture Consultant

David Talbot (ADAS), Horticulture Consultant

Location of project: Baginton Nurseries, Coventry, Warwickshire

Industry Representative: Caroline Shove, Bryants Nurseries Ltd, Water Lane, Bovingdon, Hemel Hempstead, Hertfordshire, HP3 0NA

Date project commenced: 1 April 2017

Date project completed 31 March 2019

(or expected completion date):

Grower Summary

Headline

- Rhizopon AA applied as a pre-sticking quick dip treatment improved rooting in both six day old and nine day old Geranium cuttings.
- A water only quick dip treatment alone can improve rooting.
- Serenade applied as a long dip can improve cutting quality.

Background

The Bedding and Pot Plant Centre (BPPC) has been established to address the needs of the industry via a programme of work to trial and demonstrate new product opportunities and practical solutions to problems encountered on nurseries. Knowledge transfer events including trial open days and study tours are also included in the programme.

The work programme is guided by a grower-led Management Group that includes members of the BPOA Technical Committee, and representatives from Baginton Nurseries, Coventry the host nursery for the BPPC, and growers representing both the bedding and pot plant sectors.

This is the Bedding and Pot Plant Centre report for:

Objective 2: *To evaluate a range of products alone or in combination, to increase the success rate and reduce rooting time in unrooted cuttings.*

Summary

The 2015 AHDB/BPOA US study tour provided the inspiration for this trial, where Dr John Dole (Floriculture Professor, NCSU, North Carolina State University) presented a summary of trials carried out to resolve cutting quality problems that develop during delays in transit or as a result of incorrect storage, including loss of condition, dehydration and disease. In the UK, growers are increasingly taking advantage of the widening range of plant varieties available as un-rooted cuttings from an international market. This trial builds on the US work and incorporates treatments based on grower feedback and products available in the UK. The 2017 trial is a continuation of work carried out in 2016, with the most promising treatments applied both alone and in combination to cuttings of Geranium Green Leaf Series 'Bianca'.

The trial was carried out between March and April 2017. Cuttings (5000) of Geranium Green Leaf Series 'Bianca' were sourced from Newey Roundstone Nursery and dispatched from the

mother stock location in Addis Ababa, Ethiopia, in week 8. On arrival at Baginton Nurseries (28 February 2017, week 9), the packaging was opened, the cuttings agitated to release any ethylene that may have been present, and immediately refrigerated. On 3 March (week 9), 1740 cuttings were removed from the fridge and mixed up together. A sub-sample of 20 cuttings were assessed for quality and stem thickness before the treatments were applied and cuttings stuck (Sticking 1). On 6 March (week 10), a further 1740 cuttings were removed from the fridge, assessed and treated (Sticking 2).

The cuttings were treated with Omex SW7 (wetting agent), Signum (boscalid plus pyraclostrobin), Rhizopon AA tablets (rooting hormone) and Serenade ASO (*Bacillus subtilis* QST 713), either in combination or alone (**Table 1**); Signum and Serenade ASO were applied under an experimental permit. Each treatment was applied as a quick dip (prior to sticking - QD, five second, cut end of cuttings only), a long dip (prior to sticking - LD, 30 minute full submersion) and as an overhead spray (after sticking), with relevant water controls. Once stuck, the cuttings were watered in and rooted under glass (15°C, vented at 21°C, 90% RH) on a heated bench (21°C). A frame was constructed around the bench and the trial was covered with white polythene to maintain humidity. Root development was monitored weekly after sticking.

Table 1. Treatment list used for cuttings, 2017

Treatment	Product*	Application	Dose rate (ml/ L)
1	Omex SW7	Quick dip	2.5
2	Omex SW7	Long dip	2.5
3	Omex SW7	Spray	2.5
4	Signum	Quick dip	6.75
5	Signum	Long dip	6.75
6	Signum	Spray	6.75
7	Serenade ASO	Quick dip	50
8	Serenade ASO	Long dip	50
9	Serenade ASO	Spray	50
10	Omex SW7 + Signum	Quick dip	2.5 + 6.75
11	Omex SW7 + Signum	Long dip	2.5 + 6.75
12	Omex SW7 + Signum	Spray	2.5 + 6.75
13	Omex SW7 + Serenade ASO	Quick dip	2.5 + 50
14	Omex SW7 + Serenade ASO	Long dip	2.5 + 50

15	Omex SW7 + Serenade ASO	Spray	2.5 + 50
16	Rhizopon AA tablets	Quick dip	6 tablets
17	Rhizopon AA tablets	Spray	6 tablets
18	Rhizopon AA tablets + Omex SW7	Quick dip	6 tablets + 2.5
19	Rhizopon AA tablets + Omex SW7	Spray	6 tablets + 2.5
20	Rhizopon AA tablets + Signum	Quick dip	6 tablets + 6.75
21	Rhizopon AA tablets + Signum	Spray	6 tablets + 6.75
22	Rhizopon AA tablets + Serenade ASO	Quick dip	6 tablets + 50
23	Rhizopon AA tablets + Serenade ASO	Spray	6 tablets + 50
24	Rhizopon AA tablets + Omex SW7 + Signum	Quick dip	6 tablets + 2.5 + 6.75
25	Rhizopon AA tablets + Omex SW7 + Signum	Spray	6 tablets + 2.5 + 6.75
26	Water only	Quick dip	N/A
27	Water only	Long dip	N/A
28	Water only	Spray	N/A
29	Untreated control (watered in only)	N/A	N/A

*Products not currently authorised for use on protected ornamentals or for dip application were applied under experimental permit 01098/17.

Cutting and root quality, 7 DAT (days after treatment) are summarised in **Table 2** and below:

Sticking 1

- None of the treatments significantly improved cutting quality.
- Root quality was improved by QD treatments that included Rhizopon, either alone or in combination with a fungicide. Cutting quality was either unchanged or worse than the untreated control.
- Root quality was significantly improved by a water only quick dip compared with the untreated control but not by as much as the Rhizopon treatments.
- Rhizopon AA + Omex SW7 (QD) treatment did not significantly improve root quality by 7 DAT, and cutting quality was poor throughout the trial for this treatment.

Table 2. The effect on plant quality and rooting of pre-sticking treatments applied to six day old and nine day old cuttings of Geranium ‘Bianca’, assessed seven days after treatment

T	Product	Method	Mean cutting quality (of 15 cuttings)		Mean root quality score (of 15 cuttings)	
			6 day old cuttings	9 day old cuttings	6 day old cuttings	9 day old cuttings
1	Untreated control	-	2.25	2.20	0.20	0.10
2	Water only	Quick dip	2.30	2.50	0.65	0.50
3		Long dip	2.50	2.45	0.25	0.20
4		Spray	2.30	2.35	0.20	0.30
5	Omex SW7	Quick dip	2.15	2.35	0.50	0.35
6		Long dip	1.05	1.65	0.20	0.35
7		Spray	2.30	2.30	0.70	0.55
8	Signum	Quick dip*	2.20	2.40	0.15	0.20
9		Long dip*	2.10	2.10	0.40	0.25
10		Spray	2.30	2.50	0.30	0.30
11	Serenade ASO	Quick dip*	2.20	2.50	0.25	0.30
12		Long dip*	2.45	2.70	0.30	0.20
13		Spray	2.20	2.35	0.35	0.50
14	Omex SW7 + Signum	Quick dip*	2.05	2.15	0.20	0.20
15		Long dip*†	-	-	-	-
16		Spray	2.45	2.50	0.50	0.65
17	Omex SW7 + Serenade ASO	Quick dip*	2.50	2.40	0.30	0.20
18		Long dip*	1.00	1.10	0.05	0.25
19		Spray	2.25	2.30	0.55	0.45
20	Rhizopon AA tablets	Quick dip	2.25	1.50	1.15	0.90
21		Spray	2.40	2.50	0.15	0.40
22	Rhizopon AA tablets + Omex SW7	Quick dip	1.30	1.65	0.25	0.70
23		Spray	2.20	2.30	0.50	0.25
24	Rhizopon AA tablets + Signum	Quick dip*	2.05	1.40	1.30	0.45
25		Spray	2.15	2.20	0.40	0.25
26	Rhizopon AA tablets + Serenade ASO	Quick dip*	2.25	1.45	1.25	0.45
27		Spray	2.25	2.30	0.40	0.25
28	Rhizopon AA tablets +	Quick dip*	1.65	1.25	0.40	0.75
29	Omex SW7 + Signum	Spray	2.50	2.35	0.40	0.30

Cutting quality was assessed on a scale of 0-4 (0 = dead; 1 = very poor, yellow; 2 = green but no new growth, small; 3 = green with new leaves developing; and 4 = green with new growth). Root quality scores: 0 = dead; 1 = callous formed; 2 = finely rooted in up to 25% of cell; 3 = rooting in 25-50% of cell; 4 = Rooting in 51 = 81% of cell. Values in red are significantly better than untreated control. †Omex SW7 + Serenade ASO (LD) – all plants in this treatment died by 7 DAT. *No label recommendations.

Sticking 2

- As for sticking 1, root quality was improved by QD treatments that included Rhizopon, either alone or in combination with a fungicide. However, cutting quality was worse than the untreated control for these treatments.
- Serenade ASO (LD) was the only treatment to significantly improve cutting quality compared to the untreated control by 7 DAT.

General comments

- Omex SW7 + Signum (LD) treatment caused 100% cutting failure by 7 DAT for both sticking dates, and is not a suitable treatment for Geranium cuttings.

- Signum (LD) left a white residue on the cuttings.
- Bud development was monitored as more buds may be produced by plants under stress, however this did not appear to occur in this trial.

Conclusions

- Compared to the trial carried out in 2016, delivery of the cutting material was not delayed. The cuttings were received, any ethylene that may have been present released, and refrigerated within three days, with minimal deterioration in cutting quality, so treatments were less challenged.
- The results from this trial indicate that simple, cost effective treatments can provide the best results. For example, rooting can be improved significantly simply with a water only quick dip; this was also evident in the trial carried out in 2016. Rhizopon AA appeared to improve rooting in combination with a number of other products, it also significantly improved rooting when applied alone, and cutting quality was better than when it was mixed with other products.
- While a number of treatments improved root quality in this trial, there was little improvement in cutting quality, and some deterioration. Conversely, the Serenade ASO (LD) improved cutting quality in sticking 2, but this was not accompanied by improved root quality.
- Omex SW7 + Signum (LD) is not a suitable treatment for Geranium cuttings and neither product significantly improved cutting quality or rooting when combined with Rhizopon AA compared with Rhizopon alone.

Financial benefits

The benefits of this work are directly linked to reduced waste and quicker throughput of product. Defra Basic Horticultural Statistics indicate that in 2013 £23 million worth of cuttings and young plants were imported into the UK, so the application of this work covers a large amount of plant material. Treatments costs are provided in **Table 3**.

Cuttings that are unusable due to a delay in transit may be replaced by the supplier, which would delay the finished product, or the supplier may not be able to provide replacements. In either case it may be necessary to purchase replacement plants from an alternative supplier. The cost of plants sourced from surplus lists is likely to be 10-20% higher than the grower's sale price to his client, excluding labour, labelling, input or transport costs.

Any gaps in supply can jeopardise client relationships with the potential for penalties to be applied under some contracts. Sourcing plants from an alternative supplier's surplus list

increases the risk of supplying inferior quality plants, the plants may be a different variety or quantity and there may be insufficient to fill the gap in the production programme.

Table 3. Treatment costs

Item	£/unit + VAT	Rate	**Cost / treatment (1000 cuttings) SPRAY & QUICK DIP	**Cost / treatment (1000 cuttings) LONG DIP
Geranium 'Bianca'	0.08-0.1p each plus 0.036p royalty			
Serenade ASO	£124.74 / 10L	10L/ha	24.95ml = £0.31	1000ml = £12.47
Signum	£161.70 / 2.5 kg	1.35kg/ha	3.37g = £0.22	135g = £8.73
Fructose	£4.70 / 100 g	2L/ha	g = £0.24	200g = £9.40
Rhizopon	£21.00 / 20 tablets	0.06kg/ha	3 tablets = £3.15	120 tablets = £126
Omex SW7	£54.76 / L	0.5L / ha	1.25ml = £0.07	50ml = £2.74

*unrooted cuttings. ** excluding labour costs

Potential financial benefits will be achieved through energy savings due to faster root development and reduced crop throughput time e.g. by three days. The cost to increase the air temperature of a one acre glasshouse to 18°C (outside temperature 5 °C) is estimated at £327.25 per day (air heater fuelled by gas oil). Reducing throughput time by three days will provide an estimated energy saving of £975.81. However, any savings will need to be adjusted to include the additional labour costs incurred due to applying dip treatments, for example, which are labour intensive.

Reducing throughput time will provide the added benefit of freeing up glasshouse space for other crops.

Action points

- After reviewing your rooting environment consider using Rhizopon AA, or as a minimum water only, as a pre-sticking quick dip (five seconds) treatment to improving root development in Geranium, particularly when cuttings have been delayed in transit.
- Record sticking rates with and without dipping to allow accurate estimate of labour cost of treatment and effect on sticking rates.